



DARK ENERGY  
SURVEY

# Follow-Up Status for White Dwarf Calibrators

- Science requirements (DocDB 20) includes photometric calibration to 2% (goal is 1%), colors to 0.5%, and absolute scale to BD+17 to 0.5% ... largely driven by supernova.
  - In particular, R-6, R-10, R-11, G-4, G-5 use WDs to develop.
  - R-12 & R-13 can be supported by WDs
- DA White Dwarfs (DA=hydrogen atmosphere) have spectra well modeled by two parameters: effective temperature,  $T_{\text{eff}}$ , and surface gravity,  $\log g$ , such that their color magnitudes can be calculated and measured and then compared.
- The DES WD Calibrations sub-Group is pursuing development of a “Bronze” and “Gold” sample of WDs in the DES footprint.
  - Gold sample (~30+) will allow the DES to achieve the requirements of the SRD.
  - Bronze sample (~100+) might have slightly larger uncertainties (say 2% vs. 1%) which can be refined.



# Activities towards more DA White Dwarfs

- Began CTIO-2009B to begin targeted follow-up of BCS color and pm selected WD candidates (Aug 2009 and Dec 2009 runs). 1.0m + Y4KCam
- These runs were concentrated on developing calibration patches w/l the BCS footprints to support a Blanco\_MOSAIC u-band BCS survey (never awarded in 3 tries). Gave us the basis for the current DES-WD plan.
- CTIO-2011B: 11 night run (1.0m + Y4KCam) in Nov. where we began targeting
- The SuperCOSMOS color-pm selected WDs
  - Rowell & Hambly, 2011; photographic survey.
  - Filter issues 1<sup>st</sup> 3 nights (DES\_griz, Johnson-U)
  - 29 targets in rgU
  - Switched to SDSS-ugriz filters on night 4:
  - 83 at rgu; 8-rgU repeats; 3-KPNO-10/11 repeats
- CTIO-2112B: 7 night run (0.9m+CFCCD) in Dec.
  - 41 ugriz + 5 of MaxVis field (6 were NP, but "northern")
- CTIO-2012B: 1.5m spectroscopy time (24 hours of service observing).
  - 19 targets spread over 6 nights.



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# Activities towards more DA White Dwarfs

- APSU is a 5% partner in the WIYN 0.9m consortium at KPNO.
- Use this time to target the “northern” WDs (equator to  $\sim -20$  dec.).
- S2KB has been the detector, but it is old and has some noise issues.
- Have to factor the observing around other projects (students, other faculty) and weather.
  - Oct. 2011: 26 ugriz
  - Mar. 2012: 10 ugriz
  - Jan. 2013: 24 ugriz (2 CTIO 12/12 NP targets)



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# Future Activities

- HDI is coming on-line at the WIYN 0.9m to replace S2KB (~Oct. 2013)
  - Much better camera – larger FOV, better blue QE, MCUH faster readout.
- KPNO & SMARTS have taken all the visible light low-med. Resolution spectrographs off of the small telescopes for the next semester (CTIO-1.5m, KPNO-2.1m).
- 2013B:
  - 10 nights CTIO 0.9m+CFCCD
  - 4 nights SOAR - spectroscopy
  - 4 nights KPNO – spectroscopy
  - 11 nights WIYN 0.9m + S2KB May-June
- Summer 2013 – JAS plus 2 students will be at FNAL for 10 weeks
  - Finish all the reductions not completed yet.